

REMARKS

Claims 3 - 5, 8 and 9 are in the application and are presented for consideration. By this amendment, Applicant has addressed all of the issues relating to form. Specifically, Applicant has addressed each of the outstanding objections. Applicant further makes a proposal for claim changes based on issues already presented. It is requested that the Examiner provide Applicants representative with the opportunity for an interview at which time the proposed changes can be discussed and differences between the prior art as a whole and the claimed subject matter can be discussed.

Claims 3 through 10 have been rejected as being obvious based on the teachings of Koyari et al. (hereinafter the primary reference or US' 740) in view of McIntosh (hereinafter the secondary reference or US' 144). The rejection is based on the position that the primary reference discloses the use of leaf springs that operate to elastically center the outer peripheral portion of the centering disk against the side wall surfaces of the annular groove 92. As the secondary reference discloses the use of washers, the rejection states that it would be obvious to use spring washer's on the secondary reference for centering. It is further stated that the secondary reference discloses that the springs have an outer edge in continuous contact with the surface of the housing and an inner edge with the continuous annular contact with the constraint member. However, this washer is not annular and has no inner edge.

It is Applicant's position that the references together do not present teachings of each feature as specified in the claims. As such, the rejection is untenable. It is further Applicant's position that there is no suggestion in the prior art to make the combination as a proposed.

The combination of the primary and secondary references as proposed was not obvious because the two references do not address the same problem and do not address the problem which the invention of the present application solves. There is no indication that any advantage would result as to such a combination or selection of features. There is no discussion in the primary reference as to the need to provide a spring which also provides contact at an inner and outer edge. The circular or disk springs 43 and 44 of the secondary reference are not annular such that neither reference teaches or suggests this claimed feature. Of course the springs of the secondary reference are not adapted to the requirements of the primary reference. There is no issue as to any advantage which could be gained from such a substitution and as such there is no motivation or suggestion to make the substitution or combination as proposed. A substitution of the washers 106 and 108 with disc springs 43 and 44 of reference would require a change of the springs 43 and 44. There is no suggestion to make any change and there is no suggestion to make a change can provide an inner edge that maintains contact. Further, as the primary reference provides no suggestion of the contact claimed and the secondary reference never provides no suggestion of the contact claimed, the rejection is based on a situation that there is no suggestion of this feature of the invention. These points are detailed further below.

The application addresses the problem of generating a seal between two moving members.

The secondary reference uses non annular Belleville disc springs for a purpose of centering two elements which do not slidingly move one with respect to the other. As such,

there is no motivation to select discs from the secondary reference except to meet limitations of the claims (hindsight). The secondary reference includes a Belleville spring in the form of a disc (that is not annular) that is used in a different way and in a different device. The link between the primary reference and the secondary reference is that they each apply a centering spring force (in both cases washers are used to center an element of the joint). However this presents no teaching of combining as stated and no teaching of selecting a replacement spring.

The problem to be solved by the present invention is to provide a sealing arrangement that should on the one hand ensure proper sealing and reduce leakage of lubricating grease and on the other hand should maintain its efficiency also when the joint has undergone some degree of wear.

The inventive idea of the structure claimed in the present application is to use floatingly mounted laminar rings 40 in the form of Belleville springs, which are arranged such as to press with the outer annular edge against surface 24A or 24B and with the inner annular edge against the constraint member 20. The laminar rings are slidingly bearing against surface 24A or 24B and against the opposing flat surface of the constraint member 20. The use of the annular Belleville springs instead of flat laminar rings has the following advantages and solves the following problems:

- A high contact pressure is achieved in the region of the annular edges, without the need to generate too high a force between the spring, the surface 24A or 24B and the constraint member. Indeed, if the area of contact is reduced to the annular edges, even a small force generates a very high localized pressure. The high pressure localized in the region of the

annular edges ensures proper sealing. Along the surface between the annular edges a much smaller or even no pressure is generated. This efficiently reduces friction and wear;

- Wear of the mechanical components does not lead to leakages, because wear is compensated by a deformation of the Belleville spring. Once mounted the spring is deformed to the maximum extent, and is substantially flat. If the surfaces 24A, 24B on the one side and the side surfaces of the constraint member 40 on the other side become worn and the clearance between them increases, the Belleville spring assumes a slightly conical attitude (i.e. its flexural deformation is reduced). A sufficient localized pressure is still maintained along the annular edges, where pressure is required to ensure sealing.

Thus, a highly efficient sealing effect is achieved, which is maintained even in case of wear. Additionally, wear is reduced due to the reduced forces exerted between the mechanical members involved in the sliding contact.

The fact that the Belleville springs also provides for centering the constraint member 20 is only an advantageous side-effect, i.e. a bonus effect of the invention.

The primary reference teaches annular springs and there is no contact with both and the housing 42A, 42B and the opposing flat surface of the constraint member 54 (see Fig. 9).

The secondary reference does not disclose an annular spring and does not have an outer edge in contact with the housing and an inner edge in contact with a constraint member (and also no inner surface in contact with member 39 or 40)

In response to Applicant's arguments the Examiner notes that

*"...the test of obviousness is not whether the features of the secondary*

*reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art"*

Applicant does not take issue as to what the test of obviousness is not. However, obvious cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. The statement as to "*what the combined teachings of the references would have suggested*" misses the essential point that the prior art must have teachings and suggestions which would make combining features for the prior art obvious.

Under 35 USC §103, teachings of the references can be combined only if there is some suggestion or incentive (in the prior art) to do so (*Lindermann Maschinenfabrik GmbH v. American Hoist and Derrick* 221USPQ 481, 488 (Fed. Cir. 1984). The critical inquiry is whether there is something in the prior art as a whole to suggest the desirability and thus the obviousness of making the combination. The prior art, and in particular individual references, must be taken as a whole for what they fairly teach. As such, if the reference directs a person of ordinary skill the art toward a particular construction, changing this construction is not obvious, absent a specific technical teaching in the prior art indicating the obviousness of the change or desirability to make the change.

Further, the identification of the source of a problem should also be considered in determining obviousness. The purpose, function and problem solved by the prior art references

must be considered with regard to a fair consideration of the teachings as a whole, and as to whether there is incentive or motivation to combine teachings. A rejection cannot be based upon a hypothetical modification of the references in the absence of a teaching reference suggesting the combination. As the inquiry into patentability is directed towards the subject matter as a whole and not elements of the combination and their individual novelty, a rejection must be based on a teaching suggesting the combination. The combination must be based on a specific teaching or suggestion of the references, suggesting of the desirability of the combination or the desirability of selecting and discarding elements of the combination.

From the primary reference the centering of the housing and the constraint member such that the construction is more reliable even in case of wear is discussed as the purpose of the construction. If leaf springs 106 and 108 are used for centering the constraint member 54, quite obviously there is no sealing at all. Centering is required because there is a clearance between the side surfaces of constraint member 54 and the side surfaces of the seat within the latter slides. If this is correct no sealing can be achieved.

The secondary reference does not even mention the issue of sealing. The Belleville springs used there are used as centering devices and have absolutely no sealing function. They are not annular and do not have the claimed edges. Accordingly, there are no teachings which would have led or motivated the person of ordinary skill in the art to address sealing issues with a centering device. Further, there is no incentive or motivation to try to adapt the springs of US '144 to a construction of US '740. A suggestion or teaching, namely the motivation comes from Applicant's disclosure and not from the prior art. The person of ordinary skill in the art

looking for an improvement in the sealing function would certainly not have looked into the secondary reference, which does not address that problem.

The selection of the secondary reference and the combination thereof with the primary reference is a selection of elements from the references in an attempt to fashion Applicant's claimed invention. Here the prior art does not contain anything to suggest the desirability of the combination. It is Applicant's disclosure which contains information as to the desirability of a particular spring with features not suggested by either reference.

The obviousness of the combination at best only appears from hindsight, namely based on Applicant's disclosure. More particularly, the prior art as a whole does not provide a suggestion to selectively remove features from the primary reference and replace them selectively with features from the secondary reference. Without a particular teaching as to the desirability of such a swapping of features, the combination claimed cannot be considered obvious. US '740 teaches the use of leaf springs 106, 108 for centering the constraint member 54 (called centering disk in the reference). The leaf springs are constrained to the member 54 and move integrally therewith. They do not have any sealing function. US '144 teaches Belleville springs as centering means. The combination of the two references as stated in the rejection would be a device as disclosed in Fig.9 of the primary reference US '740, wherein the leaf springs 106, 108 are replaced by Belleville springs solidly mounted on the constraint member 54 and moving therewith.

However, this is not what the independent claims of the present application require. Referring e.g. to claim 3, the claim includes the feature:

*"...washer which bears via an outer edge on one of said two surfaces and via an inner edge against the opposing face of said constraint member"*

Referring e.g. to claim 5, the claim includes the feature:

*"...spring washer having an outer edge bearing against said first surface and having an inner edge bearing against said opposing first face of said constraint member to form a sealing barrier to retain lubricant in said housing and restrict lubricant from passing from said housing beyond said first surface.*

The fact that the outer edge of the Belleville spring bears against the surface of the housing (i.e. surface 24A or 24B) and with the inner edge against the opposing constraint member would not result by such a combination of the prior art. Such feature is the result of an additional selection, which is not suggested by the prior art. The rejection is untenable as the references do not contain all elements arranged as specified in the claims. Further, the references do not suggest this feature.

Referring to claim 8, the combination of the two references would certainly not result in the Belleville spring being "floatingly mounted" and moving with the seat of the constraint member. Referring e.g. to claim 8, the claim includes the features:

*"...said first laminar ring having an opening through which said first seat extends, said first laminar ring being floatingly mounted in said housing to move within said housing upon movement of said first seat..."*

and

*"...said second laminar ring being floatingly mounted in said housing to move*



*within said housing upon movement of said second seat..."*

US' 740 does not provide a floatingly mounted washer and the secondary reference US '144 also fails to suggest this. Further, even if the combination set forth in the rejection is adopted, the result would not be a better and more reliable sealing arrangement, but only a somewhat different centering system for the constraint member 54 of the primary reference US '740.

At least claims 8 and 9 are clearly novel and not obvious since they include further limitations which are disclosed neither by US' 740 nor by US '144. Thus, even if one takes the position that the combination of the two references would have been obvious (which is not supported as noted), the claimed invention would not result from the combination, as noted and particularly, the features of claim 8 (and depending claim 9) are clearly not suggested. The prior art does not disclose the features of claim 8 noted and further fails to teach the features of claim 9 such as:

*"...having an outer edge constantly bearing against said second surface during movement of said second laminar ring and having an inner edge constantly bearing against said opposing second face of said constraint member during movement of said second laminar ring to form a sealing barrier to retain lubricant in said housing and restrict lubricant from passing from said housing beyond said second surface."*

The sliding or floating nature of the rings as highlighted in claims 8 and 9 further highlights the important sealing nature of Applicant's invention, as opposed to the centering function provided with the structure according to the secondary reference. The clearly stated centering

function of centering disks 106 and 108 of US '740 (a clear teaching of the use of leaf springs 106, 108 for centering the constraint member 54) does not lend itself to a sliding/floating. In order to advance the case, Applicant suggests similar changes to claims 3 and 5 as follows:

3. (Proposed Amendment) A wide-angle constant-velocity joint comprising:

two forks forming input and output members of the joint, the forks having respective spherical end heads;

two spiders;

a central core forming a housing;

one basically discoidal constraint member forming seats for the spherical end heads of said two forks, said housing receiving said constraint member for sliding movement in a transverse plane of symmetry of the central core, said constraint member moving when in use in the transverse plane, said housing having two surfaces disposed parallel to the transverse plane;

a laminar ring slidingly interposed between one of said two surfaces and an opposing face of said constraint member resulting in continuous sliding annular contact with said one of said two surfaces and with said opposing face of said constraint member; and

another laminar ring slidingly interposed between another one of said two surfaces and another opposing face of said constraint member resulting in continuous sliding annular contact with said another one of said two surfaces and with said opposing face of the constraint member, wherein at least one of said laminar ring and said another laminar ring is formed of an elastic material and is shaped as a Belleville washer which bears via an outer edge on one of said two surfaces and via an inner edge against the opposing face of said constraint member.

5. (Proposed Amendment) A wide-angle constant-velocity joint comprising:

a first fork forming an input or output member of the joint, said first fork having a first

fork spherical end head;

a second fork forming an input or output member of the joint, said second fork having a second fork spherical end head;

a central core forming a housing;

a first spider pivotally connected to said first fork and to said housing;

a second spider pivotally connected to said first fork and to said housing;

a discoidal constraint member having a first seat receiving said first fork spherical end head and having a second seat receiving said second fork spherical end head, said housing supporting said constraint member for sliding movement in a transverse plane of symmetry of the central core, said constraint member moving when in use in the transverse plane, said housing having a first surface and a second surface disposed parallel to the transverse plane;

a first laminar ring slidingly interposed between said first surface and an opposing first face of said constraint member resulting in continuous sliding annular contact with said first surface and with said opposing face of said constraint member; and

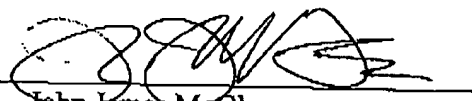
a second laminar ring slidingly interposed between said second surface and an opposing second face of said constraint member resulting in continuous sliding annular contact with said second surface and with said opposing second face of the constraint member, wherein said first laminar ring is formed of an elastic material shaped as a diaphragm spring washer having an outer edge bearing against said first surface and having an inner edge bearing against said opposing first face of said constraint member to form a sealing barrier to retain lubricant in said housing and restrict lubricant from passing from said housing beyond said first surface.

With regard to this proposal, Applicant requests that the Examiner consider the above comments and discuss the outstanding issues with Applicant during a brief telephone interview. It is Applicant's hope that such a amendments can advance the prosecution and place the application in condition for allowance. Further, as the changes present issues presented in claim

8 and the combination of features of claim 8 are clearly not suggested by the prior art, such changes place the application in better form and further differentiate the invention from a prior art.

Favorable consideration is requested.

Respectfully submitted  
for Applicant,

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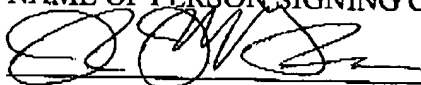
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SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY THAT THIS AMENDMENT IN RESPONSE TO THE OFFICE ACTION DATED JULY 12, 2005 FOR SERIAL NO. 10/748,608 (18 PAGES IN ALL) IS BEING FACSIMILE TRANSMITTED TO THE PATENT AND TRADEMARK OFFICE FACSIMILE NUMBER 571-273-8300 ON THE DATE SHOWN BELOW.

JOHN JAMES MCGLEW  
NAME OF PERSON SIGNING CERTIFICATION

  
SIGNATURE

DATED: October 4, 2005

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